

M.Sc. (Chemistry) (CBCS Pattern) Sem-II
PSCCHT07 - Physical Chemistry

P. Pages : 2

Time : Three Hours



GUG/W/22/11230

Max. Marks : 80

1. a) Discuss HMO theory by applying to 1, 3 butadiene and ethylene molecule. **8**
- b) Discuss the application of molecular orbital theory to H_2^+ molecule. **8**

OR

- c) Explain Zeeman splitting. **4**
- d) Discuss Russell – Sanders coupling. **4**
- e) Use 2S and 2P atomic orbitals to construct SP – hybrid orbitals. **4**
- f) Using perturbation theory obtain the ground state energy of helium atom. **4**
2. a) Discuss Stirling approximation. Derive an expression for Fermi – Dirac statistics. **8**
- b) Describe Debye – Huckel theory for activity co-efficient's of electrolytic solutions. **8**

OR

- c) Discuss Bose – Einstein statistics. **4**
- d) Derive an expression for entropy of mixing and enthalpy of mixing of non-ideal solutions. **4**
- e) Discuss any one method for the determination of activity and activity coefficient. **4**
- f) Write a note on Le – Chatelier's principle. **4**
3. a) Discuss the thermodynamics of Frenkel and Schottky defects. **8**
- b) i) Discuss the co – precipitation as a precursor to solid state reaction **8**
- ii) Describe the B. C. S. theory.

OR

- c) Write a note on colour centres. **4**
- d) Discuss the Kinetics of solid state reaction. **4**
- e) Explain super conductor's and Meissner effect. **4**
- f) Write down in brief about electronic structure of solids. **4**

4. a) Write a note on. 8
i) GM – counter.
ii) Scintillation counter.
- b) Discuss isotopic dilution analysis and NAA. 8

OR

- c) Write a note on liquid drop model. 4
d) Explain semi – empirical mass equation. 4
e) Discuss thermonuclear reactions. 4
f) Explain radiometric titration. 4
5. a) State variation principle. 2
b) Define Spin orbit coupling. 2
c) Calculate the mean activity coefficient of 0.01 M NaCl solution at 25°C. 2
d) What is general principles of solid state reaction? 2
e) Explain perfect crystal. 2
f) Write a note on P – n junction. 2
g) What is meant by radioactive decay? 2
h) Give the application of liquid drop model. 2
